

RECEIVED
CENTRAL FAX CENTER

MAY 04 2009

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 25-44 and 46-50 are in the case.

I. CLAIM OBJECTIONS

Claim 30, 31, 36, 37, 41 and 42 are objected to because of the brackets around the ranges. In addition, claim 25 is objected to for the lack of a comma between "carbon monoxide" and "methanol". In response these claims have been corrected in the present response. Withdrawal of the objections is respectfully requested.

II. THE FORMAL REJECTIONS

Claim 25 stands rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite because of ambiguity as to whether the limitation "at least one non-hydrohalogenoic acid promoter" is optional. In response, and without conceding to this rejection, this limitation has been moved prior to the phrase, "optionally at least one of."

Claims 25 and 39 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite in view of the expression "and/or." In response, and without conceding to this rejection, claim 25 has been amended to delete "and/" from the term "and/or". Claim 39 has been amended to insert the phrase "at least one of" prior to "molybdenum" and to delete "/or" from the term "and/or". No new matter is entered.

II. THE OBVIOUSNESS REJECTIONS

Claims 25-31, 43-44, and 46-50 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Baker *et al.* (EP 0752406) (Baker) in view of Bruner, Jr. *et al.* (US 5,710,325) (Bruner). Dependent claims 32-37 stand rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Baker in view of Bruner and further in view of Pesa *et al.* (U.S. 4,469,886) (Pesa). Dependent claims 38-42 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Baker in view of Bruner and further in view of Wegman *et al.* (U.S. 6,521,783) (Wegman). The rejections are respectfully traversed.

Claim 25 is directed to a process for the production of acetic acid by reacting carbon monoxide with methanol and/or reactive derivative thereof in a liquid reaction composition comprising methyl acetate, a finite concentration of water, acetic acid and a catalyst system. The system requires an iridium catalyst a methyl iodide co-catalyst and a non-hydrohalogenoic acid promoter.

Baker relates to an iridium catalyzed, methyl iodide co-catalyzed, methanol carbonylation process for the production of acetic acid. As acknowledged in the Action, Baker does not disclose the presence of a non-hydrohalogenoic acid in the catalyst system.

The effect of the presence of a non-hydrohalogenoic acid in the catalyst system in the process of the present invention is that the rate of carbonylation is increased. Thus, as demonstrated by the Examples of the present application, surprising results are observed using non-hydrohalogenoic acids as iridium catalyst promoters. Attention in this regard is drawn, for example, to the results of Experiments 5 and C. In Experiment C, a ruthenium promoter was used but no non-hydrohalogenoic acid

HAYNES et al
Appl. No. 10/563,920
May 4, 2009

promoter. In Experiment 5, both ruthenium and a non-hydrohalogenoic acid promoter were used. The results of this experiment, and other experiments in Tables 1 to 5 of the specification, demonstrate surprisingly that improved carbonylation rates are achieved when a non-hydrohalogenoic acid promoter is used compared to the rates obtained by the use of an iridium catalyst in the presence or absence of a conventional metal promoter.

Baker therefore does not give rise to a *prima facie* case of obviousness of the presently claimed invention. Bruner also does not assist in this regard.

The problem addressed by the present invention is the need to provide an improved rate of carbonylation in an iridium-catalysed, methyl iodide cocatalysed methanol carbonylation process for the production of acetic acid. Bruner, on the other hand, relates to a process for the preparation of adipic acid ($\text{HOOC}(\text{CH}_2)_4\text{COOH}$) by hydrocarboxylation of pentenoic acid ($\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_2\text{COOH}$ and isomers thereof). The person of ordinary skill would not have consulted Bruner when looking to solve the above-described problem, since Bruner relates to the production of a C_6 di-carboxylic acid by the introduction of a carboxyl (COOH) group into a monocarboxylic acid olefin compound. The Bruner process is clearly completely different to the process of the present invention, which relates to the production of acetic acid (a C_2 mono-carboxylic acid) by the introduction of a carbonyl radical (CO) into an alcohol. The two processes are thus mechanistically different to each other, and a person of ordinary skill would not, and could not, have transferred the disclosure of an olefin hydrocarboxylation reaction to the carbonylation of an alcohol.

Further, even if the skilled person had attempted to rely on Bruner (it is believed this would not have occurred), the disclosure that certain strong acids can accelerate the hydrocarboxylation of pentenoic acid would not have lead the skilled person to conclude that such acids could have any effect on the rate of carbonylation in an iridium-catalyzed, methyl iodide co-catalyzed methanol carbonylation process for the production of acetic acid, since the two processes are not analogous, not least because the starting materials differ, the reactions taking place differ in type and mechanism and the products differ. That the two processes both employ an iodide-promoted, iridium catalyst is irrelevant.

There is nothing in Bruner which remotely suggests that the presence of a non-hydrohalogenoic acid would have any effect on an iridium catalyst when iridium is used to catalyse a methanol carbonylation reaction. The only disclosure as to the effect of a strong acid is in relation to a hydrocarboxylation reaction and the conversion of pentenoic acid to valerolactone (col. 4, lines 30-35). Neither the hydrocarboxylation of pentenoic acid nor the conversion of pentenoic acid to valerolactone take place in a methanol carbonylation reaction. Therefore, one of ordinary skill would not have concluded from Bruner that the use of a strong acid in a carbonylation reaction would have any effect on rate.

Turning to the obviousness rejection of claims 32-37 over Baker in view of Bruner and further in view of Pesa, these claims are dependent indirectly on independent claim 25 and, therefore, are not suggested by the combined disclosures of Baker and Bruner for the above-discussed reasons. Moreover, Pesa relates to a process for the selective hydrocarboxylation of propylene to produce isobutyric acid. This is a different technical

field to that of the present invention which relates to the preparation of acetic acid by the carbonylation of methanol. Thus, the person of ordinary skill would have had no motivation to consult Pesa, or Bruner and Pesa together, when looking to improve the rate of carbonylation in the carbonylation of methanol. Absent any such motivation, a *prima facie* case of obviousness has not been generated in this case.

Referring to the obviousness rejection of claims 38-42 over Baker in view of Bruner and further in view of Wegman, these claims are dependent indirectly on independent claim 25 and, therefore, are not suggested by the combined disclosures of Baker and Bruner for the above-discussed reasons. Moreover, Wegman relates to processes for the conversion of a feedstock stream comprising carbon monoxide and hydrogen to a product stream comprising at least one of an ester, acid, acid anhydride and mixtures thereof, and to processes for converting an alcohol and/or ether feedstock to oxygenated products, for example acids. The processes are carried out in the absence of halide promoters. Wegman states that the use of halide promoters is undesirable since they are highly corrosive, require the use of exotic metals in the construction of the reaction vessels and require expensive processing equipment to recover the promoter from the product stream (see, col. 1, lines 54-57). In light of this disclosure in Wegman, the person of ordinary skill, upon looking to improve the rate of carbonylation in an iridium-catalysed, methyl iodide co-catalysed carbonylation process for the production of acetic acid would have had no incentive to consult Wegman, since Wegman leads **away** from the use of methyl iodide.

Based on the above, it is clear that the combined disclosures of Baker, Bruner, Pesa and Wegman, taken alone or in combination, do not give rise to a *prima facie* case

HAYNES et al
Appl. No. 10/563,920
May 4, 2009

NIXON VANDERHYE PC Fax 703+816+4100

May 4 2009 01:57pm P013/013

of obviousness of the invention as claimed. Withdrawal of the obviousness rejections is respectfully requested.

Favorable action is awaited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: /Leonard C. Mitchard/

Leonard C. Mitchard
Reg. No. 29,009

LCM:lff
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100